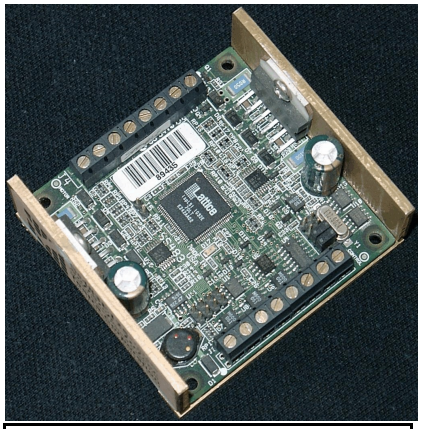
# Testra Corporation

## SS483 Series Microstepping Motor Driver

**Specifications** **Apr 2018**



# SoftStep

### *The New Art of Stepper Motor Control*

With SoftStep you get the benefits of ultra smooth microstepping regardless of your selected step size. The intelligent on board processor treats the input steps as small vector moves and smoothly chains them together using the smoothest microstepping. Chopper stabilization gets rid of commutation discontinuities, further reducing motor noise and increasing accuracy.

## HARDWARE FEATURES

- ♦ 12-48v Input Power
- ♦ Current Drive 0.4 to 4.2a standard L version 0.1 to 1.0a
- ♦ Resistor/Voltage Programmable
- ♦ Opto Isolated Inputs Step, Direction, Enable, Reset
- ♦ Step Frequency to 5Mhz
- ♦ Bipolar 4-wire D-mos Drive
- ♦ 25 khz Chopper Drive
- ♦ Electronic Fusing - Any Fault
- ♦ Thermal Shutdown
- ♦ Status Indicator - Axis ON
- ♦ Mechanical Dimensions, 2.75(69.9)x3.00(76.2)x1.20(30.5)
- ♦ Operating 0-70 C at Heatsink
- ♦ Switching PS for +5V User Power
- ♦ Dual 10 Bit D/A Current Control
- ♦ Flash Waveform Tables
- ♦ Flash Programmable Logic
- ♦ Crystal Controlled Clock
- ♦ I/O Connector Options

## FIRMWARE FEATURES

### SS483 (IM483 Compatible)

- ● Microstep Resolutions 1/2 1/4 1/5 1/8 1/10 1/16 1/25 1/32 1/50 1/64 1/125 1/128 1/250 1/256
- ● Current Reduction, 0.5 sec after last step input.
- ● On the fly step size changes

### SS483S SoftStep

- ■ Always Microsteps at 1/250 or 1/256th step size, regardless of selected input step size resulting in ultra smooth operation of your motor.
- ■ Optional custom waveforms to match individual motor characteristics, eliminating torque and velocity ripple.

## AVAILABLE OPTIONS

- ★ Custom Waveforms
- ★ CW, CCW input
- ★ Quadrature Input
- ★ Low Current 0.1 to 1.0 amp
- ★ Economy Microstep Only
- ★ Various I/O Connectors
- ★ User programmable waveform
- ★ Slow Start

## STANDARD MODELS

IMS483 Compatible
- ▸ SS483,SS483PLG,SS483-34P1

Economy Microstep Only
- ▸ SS483E,SS483ER

SoftStep
- ▸ SS483S,SS483SR
- ▸ SS483SD,SS483SDR
- ▸ SS483SL,SS483SLS
- ▸ SS483SB

Programmable
- ▸ SS483EXR

***SynchroStepping*** * All of our motion systems and drivers utilize a method that synchronously, microstep, sample and correct the current on multiple motor windings at a 20-50 kHz rate resulting in stable, quiet, smooth control of a stepper motor. US Patent # 5,650,705

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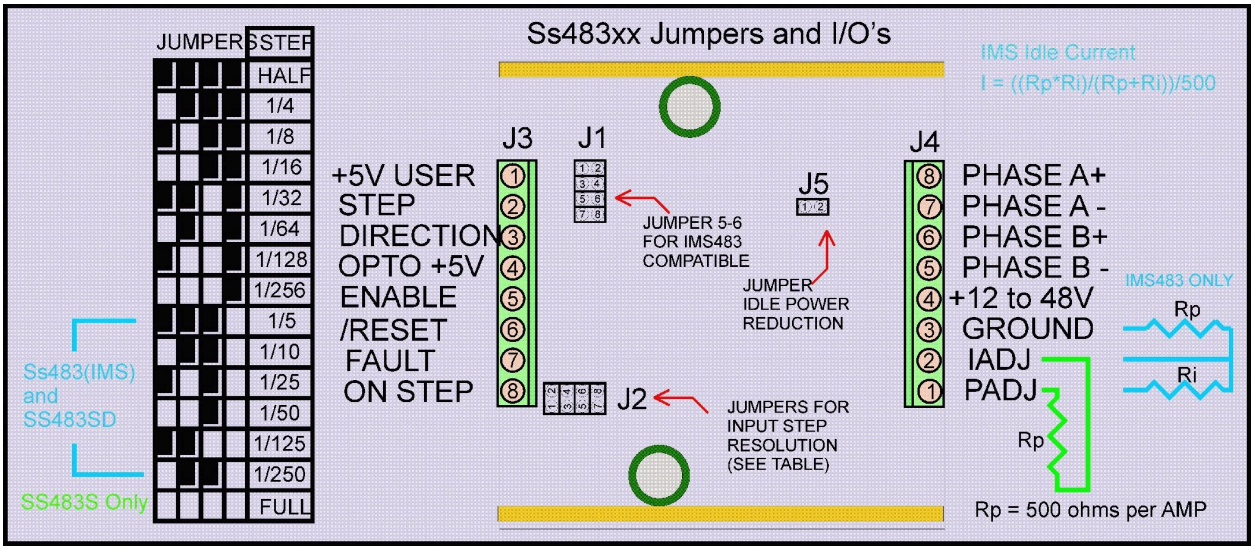
## SS483 Series Stepper Motor Driver I/O Signal Descriptions




| SIGNAL | DESCRIPTION |
|---|---|
| +5V USER J3 - 1 | This is a +5V 100ma ***output*** power source for user application. It is the same supply that is used to power the logic in the module and is derived via a switching power supply from the +12 to +48v input supply to the module. It is short circuit protected and current limited. However if shutdown occurs because of user loading the driver will also quit working. If the outputs FAULT and ON STEP are to be used to drive opto-isolators in the user equipment, this supply should be used for the positive input to the opto with the negative input connected to the signal. Twisted pair should be used to give maximum noise immunity. |
| STEP J3-2 | The STEP ***input*** is an Opto-Isolated signal. The positive input to the opto is connected to the OPTO +5V (J3-4) with a 390 ohm series resistor. The input must be driven to ground by a device that can sink at least 8 ma at 0.4v. The stepping action of the driver is triggered by the positive edge of the step pulse. |
| DIRECTION J3-3 | The DIRECTION i***nput*** is an Opto-Isolated signal. The positive input to the opto is connected to the OPTO +5V (J3-4) with a 390 ohm series resistor. The input must be driven to ground by a device that can sink at least 8 ma at 0.4v. A high input or open input cause clockwise rotation of the motor. For CW rotation Phase A goes positive and Phase B goes negative starting at zero. |
| OPTO +5V J3-4 | The OPTO +5V ***input*** is the common connection to all of the OPTO inputs of the module. For best noise immunity this should be connected to the User's +5V logic power supply that is being used by the driving source thru one conductor of each of the input signals twisted pair for optimum noise immunity.<br>For connection to PLC and other equipment using 24V logic you must connect this input in the same fashion to the +24v logic power supply. In addition 2k ohm resistors need to be put in series with all of the inputs (user driver outputs). |

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## SS483 Series Stepper Motor Driver I/O Signal Descriptions

| SIGNAL | DESCRIPTION |
|---|---|
| ENABLE<br>J3-5 | This opto-isolated ***input*** when OPEN or HIGH enables the driver, turning on the Motor phase currents. When held low the motor drive outputs are disabled and disconnected from the motor. When the driver is disabled it is safe to connect or disconnect a motor without damaging the driver. |
| /RESET<br>J3-6 | This opto-isolated ***input*** when OPEN or HIGH leaves the driver in an operating state. If the signal is brought LOW, the driver is reset to initial starting conditions which will reset the motor phases to 0 degrees (Phase A = 0 amps Phase B = Max amps) |
| FAULT<br>J3-7 | This is a non-isolated output which when HIGH (+5v) indicates a fault condition within the driver. Normally this signal will remain LOW at all times (<0.4v). There is also an onboard LED indicator which will be lit when the driver is OK, and extinguishes when a fault occurs. A normal fault condition might be caused by a motor wiring short circuit triggering the electronic circuit breaker. To reset the fault condition, either a RESET must be asserted, or the power to the module turned off then back on again. *Note: For IMS versions after 9/11/14, this signal is inverted and LED lit indicates a fault.* |
| ON STEP<br>J3-8 | This is a non-isolated ***output*** which when HIGH indicates that the driver phase position is at 0 degrees (same as reset position). The one exception to this is with an IMS compatible version (ss483) which for compatibility purposes asserts this signal at the start of each full step of the motor (0,90,180,and 270 degrees phase currents). If on the ss483 the IMS compatibility jumper is removed, this output reverts to normal operation. |
| PADJ<br>J4-1 | This pin is a connection for programming the current of the driver. In the non-IMS compatibility models this pin should be used as the return connection for the programming resistor (Analog Ground). In the IMS compatible models this pin is used for connection to the idle current reduction programming resistor, the other end of which is connected to IADJ (J4-2).<br>Idle Current = ((Ri*Rp)/(Ri+Rp))/500 where Ri is the idle current resistor and Rp is the programmed current resistor. |
| IADJ<br>J4-2 | This pin is used for programming the the current of the driver. A positive one milliamp current source is injected into this connection so that a resistor connected to ground from this pin will set a current control voltage. On the standard 4 amp maximum drivers the driver current is 2 amps per volt on this pin, or when a resistor is used 500 ohms per amp. On the low current models (L suffix) it is 0.5 amps per volt or 2k ohms per amp. The return pin for the resistor should be normally the analog ground pin PADJ (J4-1) pin, except for the IMS compatible version which uses the GND (J4-3) pin. |
| GND<br>J4-3 | This pin is used for the negative connection of the driver power supply. The heatsink of the ss483 drivers is also connected to GND. In the case of the IMS compatibility mode this pin is also used as the analog ground for the programming resistor. ***Note: In IMS compatibility mode a separate wire should be screwed into this terminal for the programming resistor. Never connect the programming resistor to ground and another point, otherwise a ground loop will exist and the driver may very well oscillate.*** |
| PWR<br>(12 to 48V)<br>J4-4 | This pin should be connected to the postive output of the driver power supply. The maximum voltage applied should not exceed 48v. This 48v includes any increase in the supply voltage due to re-generation from the motor. If you do not take this into account, the voltage may be exceeded during deceleration of the motor or crashing and driver failure will occur. |
| PHASE B-<br>J4-5 | Motor Phase B negative connection. |
| PHASE B+<br>J4-6 | Motor Phase B positive connection. |
| PHASE A-<br>J4-7 | Motor Phase A negative connection. |
| PHASE A+<br>J4-8 | Motor Phase A positive connection. Note to reverse motor direction you can just swap Phase A plus and minus connections (or Phase B). |

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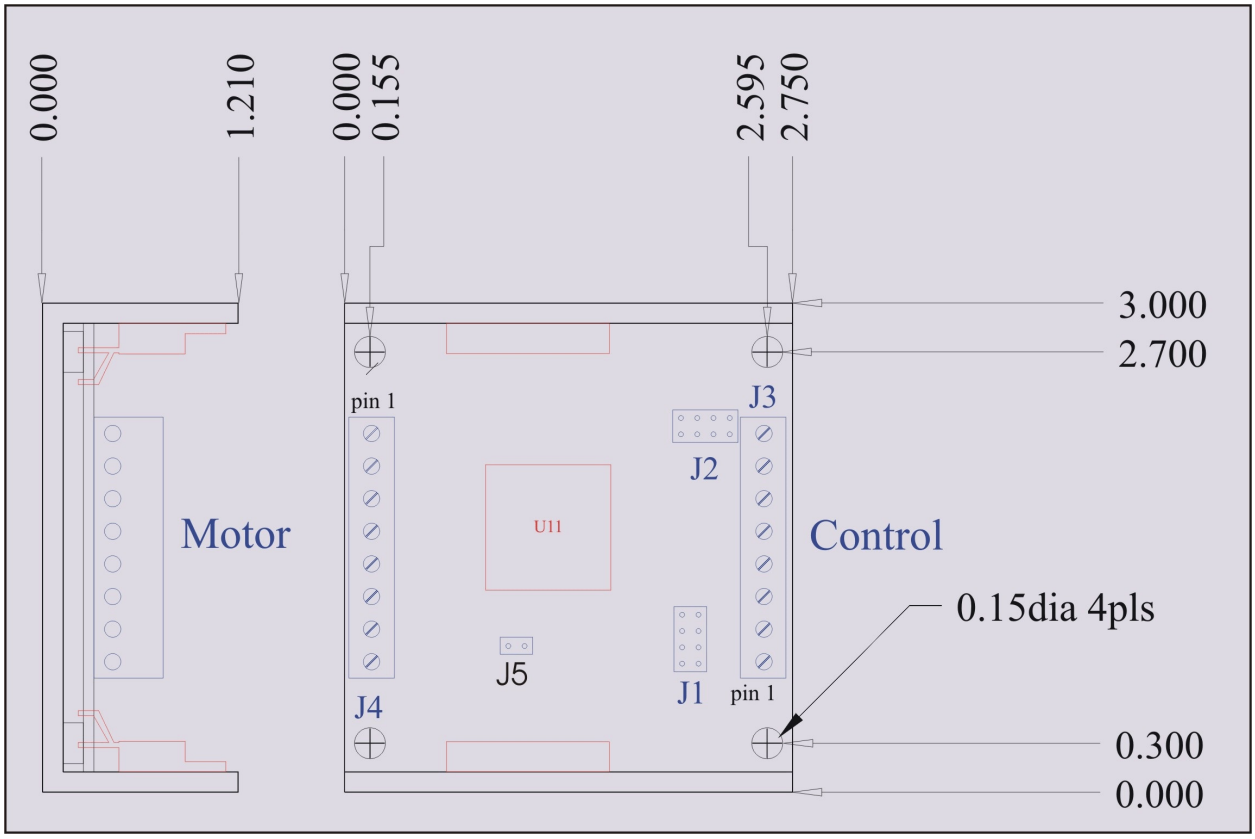


**Figure 3** SS483 Mechanical Information. Recommended to mount with 4-40 Screws.

Notes:

JI - This is the programming port used by the factory to program and calibrate the drive. The jumper between pins 5 and 8 are only installed for the IMS versions. This is factory installed and should not be removed.

J5 - This jumper should not be present with IMS versions. Current reduction on IMS versions is set by external resistor Ri. With other versions, the user has the option of installing or not this jumper. When installed, when the drive becomes idle, the current is reduced to half power which is 0.7 times the programmed current set by resistor Rp.

OPTO +5V is the common for the four opto inputs. The optos are now sensitive enough to work reliably with 3.3v, so to interface with 3.3v logic you must connect this pin to your 3.3v supply. NOT left at +5v!
If you want to drive with higher voltages, 12v or 24v you will need to add series resistors to each signal and connect this common pin to the appropriate logic supply voltage that you are using. For 12v use a series resistor of 820 or 1k. For 24v use a series resistor of 1.8k or 2.2k.

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